Biochemistry

التاريخ / / | Lecture (2) | الموضوع

أهمية

Importance of monosaccharides:-

from Greek word (glukus) ← (sweet).

(1) D-Glucose (an aldohexose $C_6H_{12}O_6$):-

الاسم
1 → Name:- 1-Glucose, 2-Dexterose, 3-Blood sugar
4-Grape sugar.

الصدر
2 → Source:- it is present in honey and fruits

3 → Importance:- 1- it's a major source of energy in human body
الأهمية
2- it's the sole source of energy for brain and red blood cells.

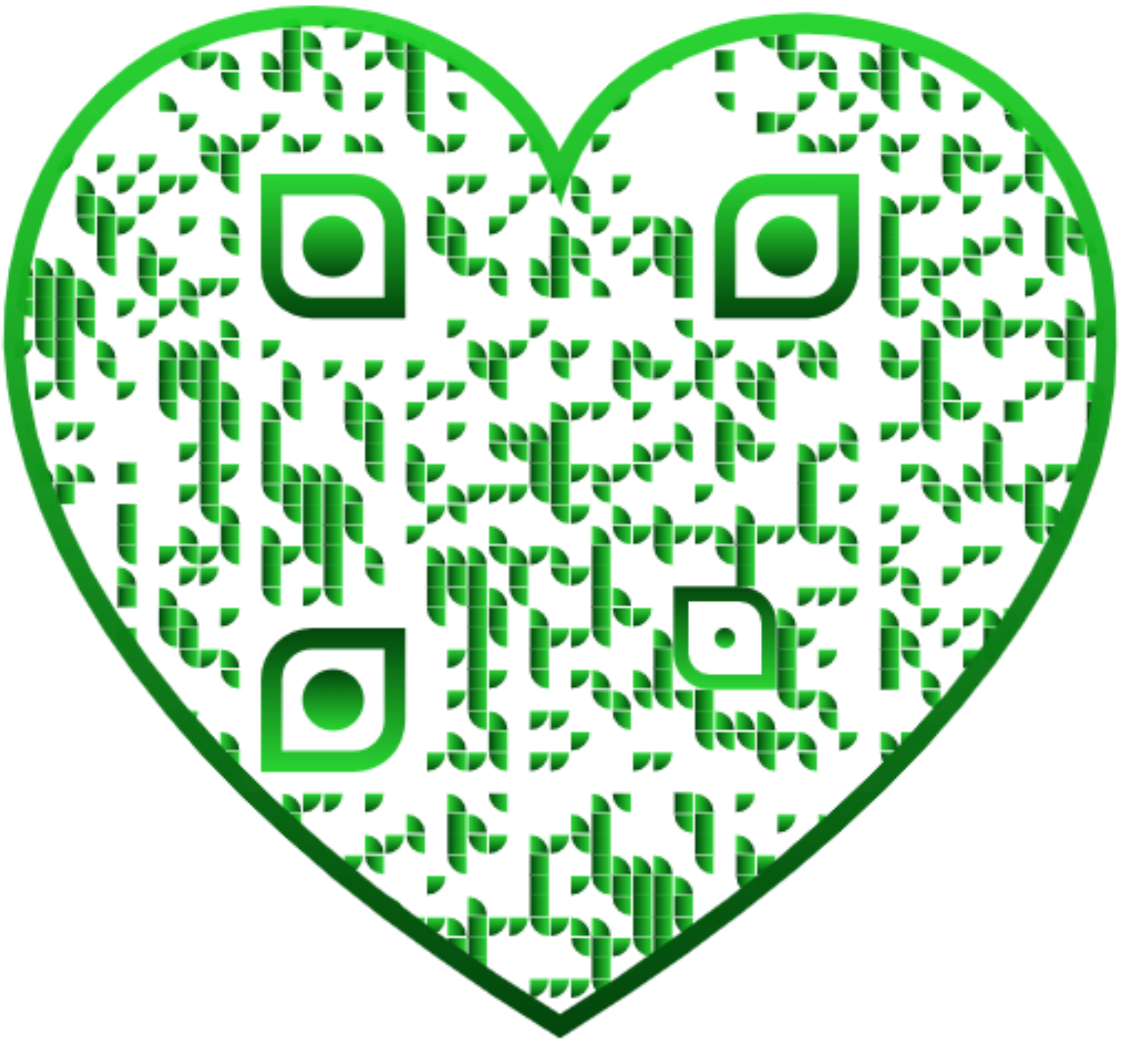
(2) D-fructose (Ketohexose $C_6H_{12}O_6$):
← the most (sweetest) Monosaccharides

1 → Name:- 1-fructose, 2-levulose, fruit sugar.
2 → Source:- Honey and fruits
3 → Importance:- ①- Major (main) sugar of semen which is used by sperms as energy source.
②-Also can be used as energy source for humans

(3) D-Galactose:- ($C_6H_{12}O_6$). Galact → (milk)

1 → Name:- Galactose.
إضافي
2 → properties:- Not found free in nature. الخواص الطبيعية
3 → Source:- Dairy product (milk).
4 → Importance:- ①- Component of lactose in milk.
② and as component of glycoproteins and compound lipid.

Scanned with CamScanner



(41) D- Ribose :-

1) Name :- Ribose.

2) Importance :- enters in the structure (backbone) of nucleic acid RNA and some coenzymes.

example :- * FAD (Vitamin B_2)
* NADH (Vitamin B_3)
* ATP, and coenzyme A (Vitamin B_5)

* Properties of monosaccharides :-

1- All monosaccharides are :- 1- Soluble (ذائب), Crystaline (بلورات), unaffected by digestive enzymes (لا تتأثر بالانزيمات الهاضمة).

2- All monosaccharides have one asymmetric (Chiral) carbon (كربون مرتبط بأربع ذرات مختلفة) or more except : dihydroxy acetone

↓

not Chiral

CH_2OH
$C=O$ (ketone)
CH_2OH

3- Optical activity.

Scanned with CamScanner

* Disaccharides: are O-glycosides which are composed of (two monosaccharides).

يعالج الإمساك

ملاحظة:-
-اي سكر لا يهضم في الجسم ← ألياف غذائية (dietary fibers)
-اي سكر يهضم في الجسم ← يعطي طاقة (Energy)

ملاحظة:- (Diatery fibers): non digestible disaccharide
↳ (laxative): to treat Constipation and prevent Cholesterol.
سهل الإمساك ويمنع الكلسترول

* Nomenclature of glycosidic bond between sugars:
read page (32) <<<

* Examples of the most important disaccharides:
1. lactose (milk sugar).
2. Maltose (malt sugar)
3. Sucrose (Sugar cane, beet sugar, table sugar)
4. Inctulose (Synthetic diasaccharides).
5. Trehalose

Scanned with CamScanner

الموضوع

التاريخ / /

أهمية

* Important disaccharides :-

(1)- lactose (milk sugar) :- => less sweet sugar.

1 → it is found in (milk)

2 → it's the best food for infants [because] :-

↳ it is the least sweet sugar so that the baby can drink a large amount of mother's milk without loss of appetite.

مكونات

3 → Composition :- Consist of β-D-galactose ① and β-D-glucose ②.

خصائص

4 → properties :- (due to free anomeric carbon in glucose residue).

1- Present α and β form. (لأن الهيبد حر)

2- Undergoes mutarotation. (إنزياح بين الـ α أو β)

3- it is reducing sugar (سكر يحول محلول النحاس من أزرق ← أحمر)

4- it can form characteristic osazone crystal [cotton ball shape]

ملاحظة :-

① (Anomeric carbon :-) aldehyde or ketone present in sugar.

↳ الهيبد أو كيتون موجود في السكر

② Any sugar that contain (free aldehyde or ketone) are called :- free anomeric carbon acquires properties and advantages, and vice versa.

أي سكر يحتوي على الهيبد أو كيتون (حر) يكتسب خصائص أو ميزات

والعكس صحيح

Scanned with CamScanner

سكر الشعير

(2) Maltose (Malt Sugar):-

تهضم اثناء هضم النشأ

1 → it is produced during digestion of Starch

2 → it does not exist in nature. (galactose) :- مثل لتوجد بالطبيعة

3 → Composition (Component) :- Consist of two molecules of (α-D-Glucose)

4 → properties :- خواصها

⇓

① present in α and β form.

② undergoes mutarotation.

③ reducing sugar.

④ can form characteristic osazone crystal (Rosette Shape) النشكل

(cotton ball) ← (نفس خواص الـ lactose ولكن الأختلاف في شكل البلورات) :Note

crystal.

Isomaltose :-

↳ Disaccharide similar to [Maltose], but :-

the linkage α-(1-6) glycoside bond instead of α-(1-4) glycoside.

⇒ produced :- during digestion of Starch and glycogen by (α-amylase).

Scanned with CamScanner

(3)- Sucrose (Cane sugar, beat sugar, table sugar):-

السكروز هو السكر الذي يعتمد عليه الجميع (الأكثر استخداما)

1→ Most abundant disaccharides in nature. أكثر السكريات تنتشر متوفر في الطبيعة

2→ found in:- (Sugar cane, beet sugar, & some fruits)

3→ Composition (component):- Consist of α-D-Glucose and β-D-fructose.

4→ properties:-

Sucrose does not contain free anomeric carbon because the anomeric carbon of both α-D-glucose (C_1) and β-D-Fructose (C_2) units are involved in formation of the glycoside bond.

ملاحظة:-
السكروز لا يحتوي على أيتون أو الهيد (حر) ← free
وخصائص السكر التابع لا sucrose يكون عكس الـ lactose و maltose

(properties)

→ * Properties:-

1) it can't form α and β form.
2) Does not undergo Mutarotation.
3) it's non reducing sugar → لا يتغير الخاص إلى أحمر (يظل أزرق لأنه مش حر)
4) it can not form crystal.

Scanned with CamScanner

التاريخ / /

الموضوع

(4) - lactulose :-

1 → Synthetic (artificial) disaccharides :- ↓
سكر اصطناعي من (lactose) توجد في الحليب أو الاعشاب

2 → produced :- from lactose by isomerization of glucose to fructose.

3 → Component (composition) :- β-D-galactose (1) and β-D-fructose (2)

4 → Importance :- (أهمية)

(1) - it can't be digested by human or animal enzyme.

(2) - it is used for treatment of (constipation), or laxative. علاج لإمساك ملين

(3) - treatment of (hepatic encephalopathy)

(4) - Act as (prebiotic)

(5) - Trehalose :-

1 → Composition (component) :- مكونات
Consist of two molecule of α-D-glucose

2 → Synthesized by :- fungi and plants تصنع من

3 → Importance :- Used in organ protection solution الأهمية
for organ transplant

Scanned with CamScanner